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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,135	03/06/2007	Sebastien Manneville	28944/50035	5486

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MILLER, MATTHIAS & HULL
ONE NORTH FRANKLIN STREET
SUITE 2350
CHICAGO, IL 60606

EXAMINER	
SHABMAN, MARK A	

ART UNIT	PAPER NUMBER
2856	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/576,135	MANNEVILLE, SEBASTIEN	
	Examiner	Art Unit	
	MARK SHABMAN	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 March 2007* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/14/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "array of several ultrasonic transducers" as claimed in claims 10 and 14 and the "pressure probe" as claimed in claim 6 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 recites the limitation "the fluid placed between two surfaces in a rheometer" in line 2. There is insufficient antecedent basis for this limitation in the claim. It appears as though the "fluid" is referring to the liquid described in line 1, however there is no prior mention of that fluid being a liquid or being placed between two surfaces in a rheometer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sierro US Patent 6,535,796 B1 (hereinafter referred to as Sierro) in view of Han US Patent 6,378,357 B1 (hereinafter referred to as Han).

Regarding **claim 1**, Sierro discloses a method for characterizing complex fluids wherein a liquid specimen put under a shearing strain in a rheometer to measure the rheological properties (column 5). Sierro further states that this shearing device could be a Couette cell as shown in figure 15. Due to the basic operation of a Couette cell,

this reads on "the two surfaces undergo relative movement one with respect to the other" as claimed. Sierro does not disclose using ultrasonic wave measurement means as is claimed, however *does* state in column 10 line 23 the use of ultrasound to measure various parameters of the sample would be useful.

Han discloses a method of fluid rheology characterization in which ultrasound is used to analyze a fluid. Ultrasonic signals are used to measure the rheological properties of a fluid as described in the summary of the invention. Since fluid flow is affected by the deformation of the fluid, the combination of Sierro in view of Han reads on the claim in its entirety. Since it is disclosed in the description of Sierro, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Sierro and Han to create a method in which the rheological properties of a fluid are tested via stressing a liquid and measuring its properties with ultrasonic means.

Regarding **claim 2**, Han discloses a method of testing via ultrasound by transmitting an acoustic signal into the fluid and receiving reflected transmissions regarding the fluid data. Han further states that the signal generated can have a frequency of up to 500 MHz which is "above 20 MHz" as claimed (column 3).

Regarding **claim 3**, the ultrasonic testing method of Han is based on transmitting a wave into the test fluid and receiving the reflection back from the particles entrapped in said fluid. As the fluid in Han is moving (as is the fluid in Sierro due to the introduced stress), the reflected energy has a different frequency than the energy transmitted. As

frequency is a function of time, a “temporal reference” of the ultrasonic data is present as the fluid moves.

Regarding **claim 4**, the observation of the fluid as described by Han is seen in figure 2 of the drawings. The receiving beam R detects along a single axis which corresponds to the claimed axis “Z”. When a particle enters the observation area, it generates "deformation data which is sensed by the receiver as described at the end of column 3. The points along the beam R, form a "continuous field of observation” as claimed. The observation step is carried out by sending in a pulse sequence in the ultrasonic range to the fluid sample at 100 KHz (column 3), however any frequency could be used depending on the sensitivity of the particulates to be detected. Reflected acoustic energy is then measured by detection means, wherein the reflected energy would correspond to "each ultrasonic pulse reflected by the reflecting particles" wherein the reflecting particles claimed correspond to the bubbles, particulates and emulsified droplets in Han. The shift in frequency of the reflected beam is due to a "displacement in the specimen" which can be calculated using a “cross-correlation technique on the ultrasonic local data” as described in column 7.

Regarding **claim 5**, column 4 of Han discloses the use of a calibration constant for determining the velocity of fluid specimen. As calibration is a means for comparing a test result to that of a predetermined value in order to adjust equipment readings, it would have been obvious to one of ordinary skill in the art at the time of invention to perform a “calibration step” prior to observation in which the known theoretical local specimen deformation data was adjusted to local deformation data measurements

collected, as claimed. Otherwise it would be impossible to determine the results based on purely the measured data without a theoretical value to compare it to.

Regarding **claim 6**, Sierro illustrates in figure 1 the use of a screen for displaying data images from the rheometer and corresponding apparatus. As the amplitude would change as a result of the particles in the flow, it would have been obvious to one of ordinary skill in the art to use the change in amplitude to determine the position as a function of time since the position based on frequency is already determined with respect to time. Further, it would have been obvious to one of ordinary skill in the art at the time of invention to use a sensing device such as a pressure probe to determine such an amplitude.

Regarding **claim 7**, Han discloses calculating a velocity profile based on the displacement of the fluid stream wherein a time domain shift based on the backscattered signals of the test fluid is used. Han further discloses determining an average velocity of the fluid stream as well (columns 4-5).

Regarding **claim 8**, Han discloses using a pulse sequence to determine the velocity of the reflection sources. Each velocity is considered to be a “profile" of each particle. The frequency of the pulses are not within the 0.1 Hz to 1 KHz rang as claimed, however, it would have been obvious to one of ordinary skill in the art at the time of invention to use whatever frequency desired in order to take measurements at whatever rate is desired. For example, if the stream has more or less particles, it might be desired to produce pulses at a higher or lower rate.

Regarding **claim 9**, the first axis “Z” is described in figure 2 of the drawings of Han. Figure 3 shows a second detection axis parallel to the first which forms a plane for the field of observation along with a second set of parallel lines originating at the tranmitter T. The shaded region is thus the total field of observation in which the second axis makes "any angle with said first axis" as claimed.

Regarding **claim 10**, Han discloses in figure 3 and column 4 an array of sample regions. Each region is analyzed separately, however it is stated that the sample regions can be analyzed simultaneously in parallel. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the teachings of Han to emit and receive multiple signals at once by reproducing the ultrasonic means to form an array of transducers.

Regarding **claim 11**, Sierro discloses an apparatus for characterizing complex fluids wherein a liquid specimen put under a shearing strain in a rheometer to measure the rheological properties (column 5). Sierro further states that this shearing device could be a Couette cell as shown in figure 15. Due to the basic operation of a Couette cell, this reads on "two surfaces in relative movement one with respect to the other” in which stress is applied to the fluid in between as claimed. Sierro does not disclose ultrasonic wave measurement means as is claimed, however *does* state in column 10 line 23 the use of ultrasound to measure various parameters of the sample would be useful.

Han discloses a device for fluid rheology characterization in which ultrasound is used to analyze a fluid. Ultrasonic signals are used to measure the rheological properties of a fluid as described in the summary of the invention. Han describes sending ultrasonic waves into the specimen in pulse sequences, reading on the "sequence of pulse firings" as claimed. The apparatus further comprises a wave receiver for detecting reflected beams or "echos" reflected back from particles in the fluid stream. Each reflection corresponds to a “wave firing" and as the firings are sequential, they are used to monitor the deformation of the fluid (caused by stress) "as a function of time." Since fluid flow is affected by the deformation of the fluid, the combination of Sierro in view of Han reads on the claim in its entirety. Since it is disclosed in the description of Sierro, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Sierro and Han to create a method in which the rheological properties of a fluid are tested via stressing a liquid and measuring its properties with ultrasonic means.

Regarding **claim 12**, column 3 of Han discloses the emitting of ultrasonic waves up to 500 MHz which is greater than 20 MHz as claimed.

Regarding **claim 13**, as disclosed previously, the apparatus of Sierro comprises a Couette cell as is claimed. A thickness of the Couette cell is not disclosed by Sierro, however it would be desirable to design it to be as thin as possible while still structurally sound to allow for penetration by the ultrasonic waves. This could be 4mm or less as claimed to reduce the power needed for the transmitting wave.

Regarding **claim 14**, Han discloses in figure 3 and column 4 an array of sample regions. Each region is analyzed separately, however it is stated that the sample regions can be analyzed simultaneously in parallel. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use the teachings of Han to emit and receive multiple signals at once by reproducing the ultrasonic means to form an array of transducers.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARK SHABMAN whose telephone number is (571)270-3263. The examiner can normally be reached on M-F 7:30am - 5:00pm, EST (Alternating Fridays Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. S./
Examiner, Art Unit 2856
/Hezron Williams/
Supervisory Patent Examiner, Art Unit 2856